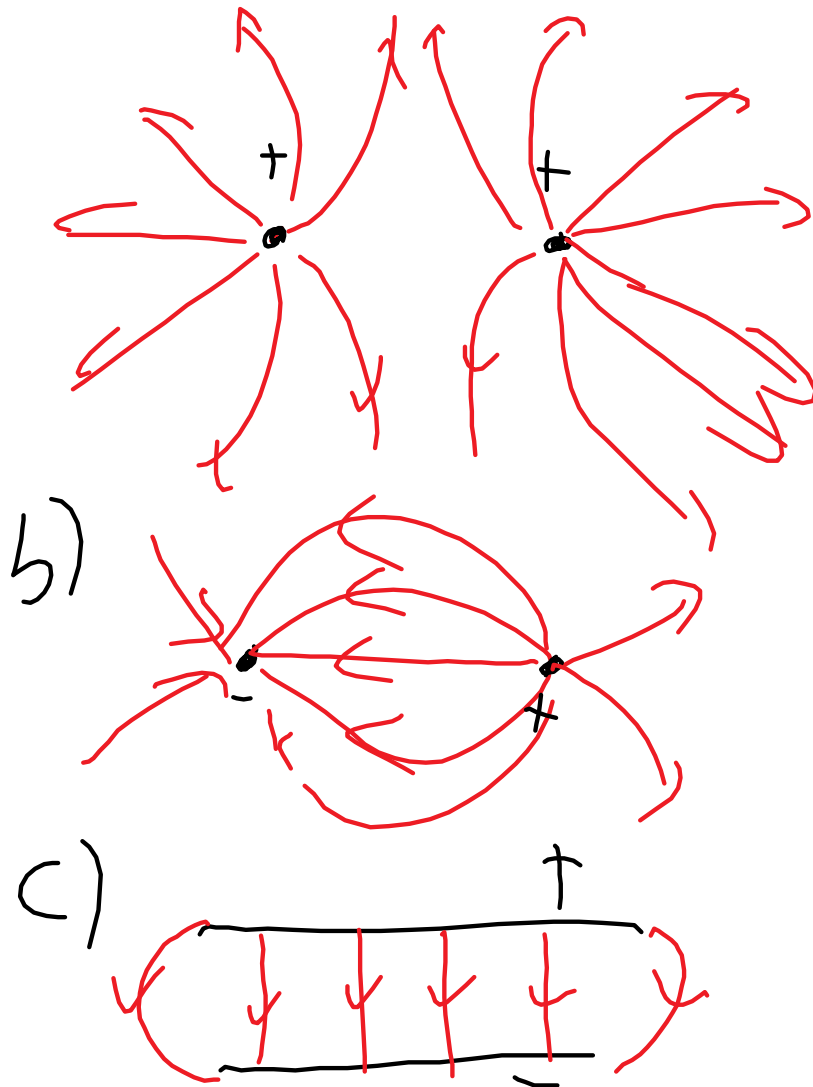


Electrostatics Practice Test

1. Charge the electroscope with the strip, bring the comb near, if it is negative the leaves go apart, if it is positive they go together.



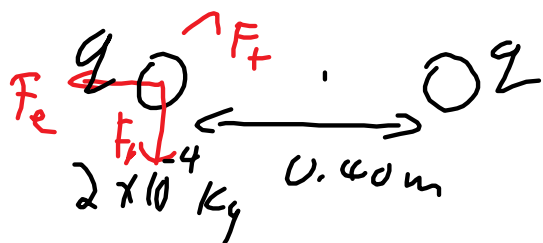
$$3. f = kQq/r^2$$

$$F_2 = k(1/2Q)(3q)/(5r)^2 = (3/50) f$$

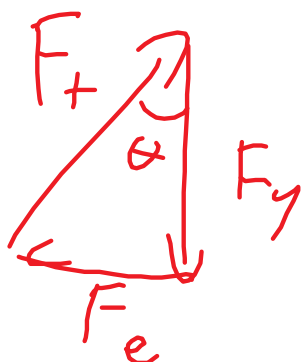
4.



$$\sin \theta = \frac{a}{1}$$



$$\theta = 11.5^\circ$$



$$\tan \theta = \frac{F_e}{F_g} = \frac{k q^2}{m g r^2}$$

$$q^2 = \frac{m g r^2 \tan \theta}{k}$$

$$q^2 = \frac{2 \times 10^{-4} (9.8) (0.4)^2 \tan 11.5^\circ}{9 \times 10^9}$$

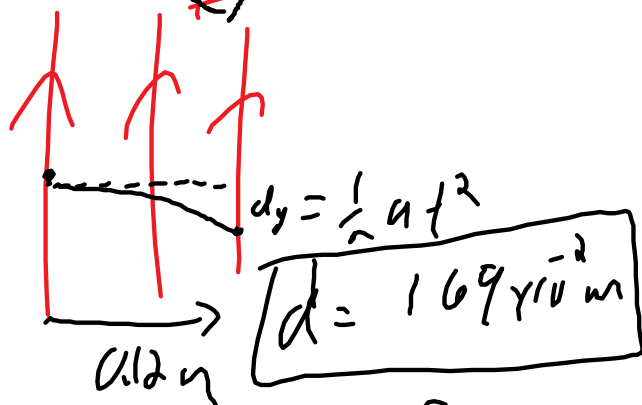
$$q = 8.4 \times 10^{-8} \text{ C}$$

$$E = 1.2 \times 10^4 \frac{\text{V}}{\text{m}}$$

3

e^-

$v_x = 3 \times 10^7 \text{ m/s}$



$$d_y = v_x t$$

$$t = 4 \times 10^{-9} \text{ s}$$

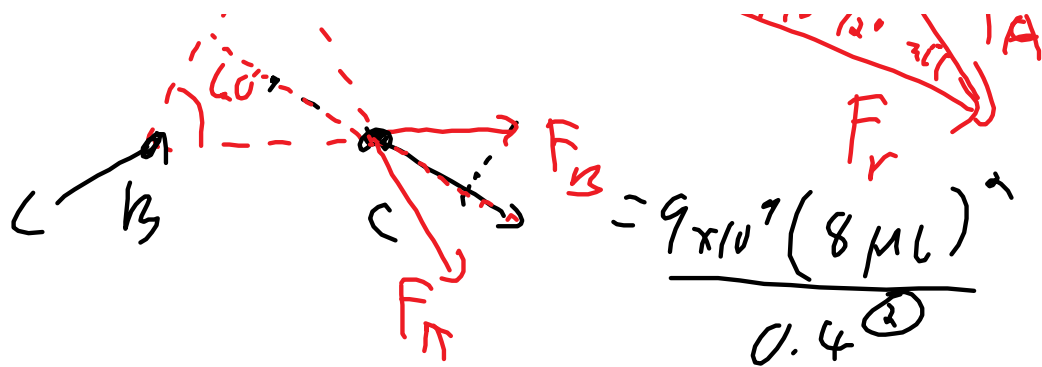
$$a = \frac{E q}{m} = 2.11 \times 10^6 \text{ m/s}^2$$

$$F_b = \frac{k Q q}{r^2}$$



6)





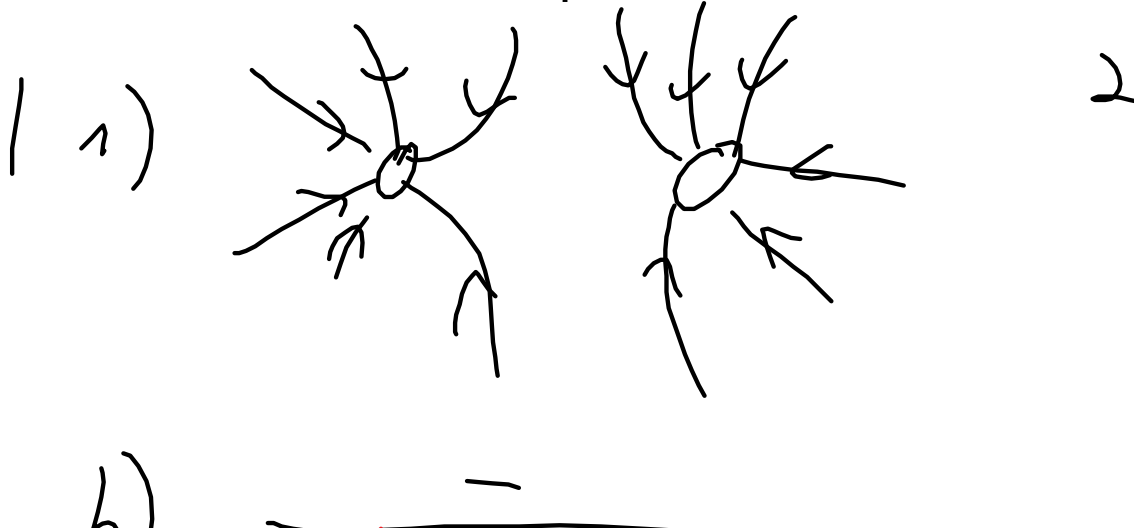
$$F = 2 F_B \cos \theta$$

$$= 6.2 \text{ N} \quad \text{radially out}$$

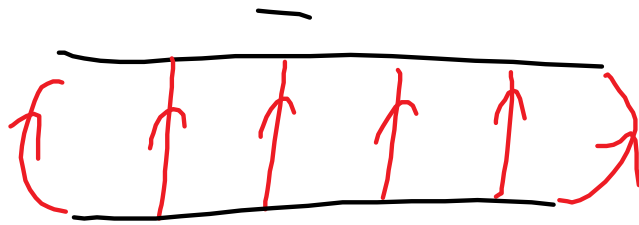
Answers to Statics Practice Worksheet

1. a) 9800N
- b) $8.5 \times 10^3 \text{ N}$
2. $2.0 \times 10^3 \text{ N}$
3. 125N and 175N
4. a) $5.3 \times 10^3 \text{ N}$
- b) $4.6 \times 10^3 \text{ N}$
5. a) 273 N
- b) 110N

Answers to the block 1-2 quiz



b)



2

$$a = \frac{F}{m} = \frac{Eq}{m} = \frac{5 \times 10^5 (1.6 \times 10^{-19})}{9.1 \times 10^{-31}}$$

$$a = 8.8 \times 10^{16} \text{ m/s}^2$$

3 a)

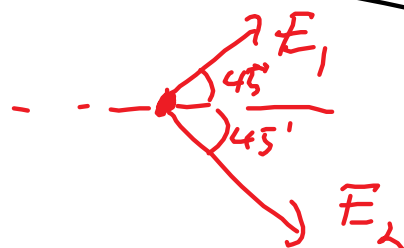
$$E = E_1 + E_2$$

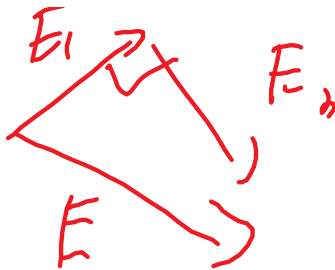
$$= \frac{kq_1}{r^2} + \frac{kq_2}{r^2}$$

$$= \frac{9 \times 10^9 (2 \times 10^{-4})}{0.35^2} + \frac{9 \times 10^9 (2 \times 10^{-4})}{0.35^2}$$

$$= 3.7 \times 10^7 \frac{\text{N}}{\text{C}}$$

b)



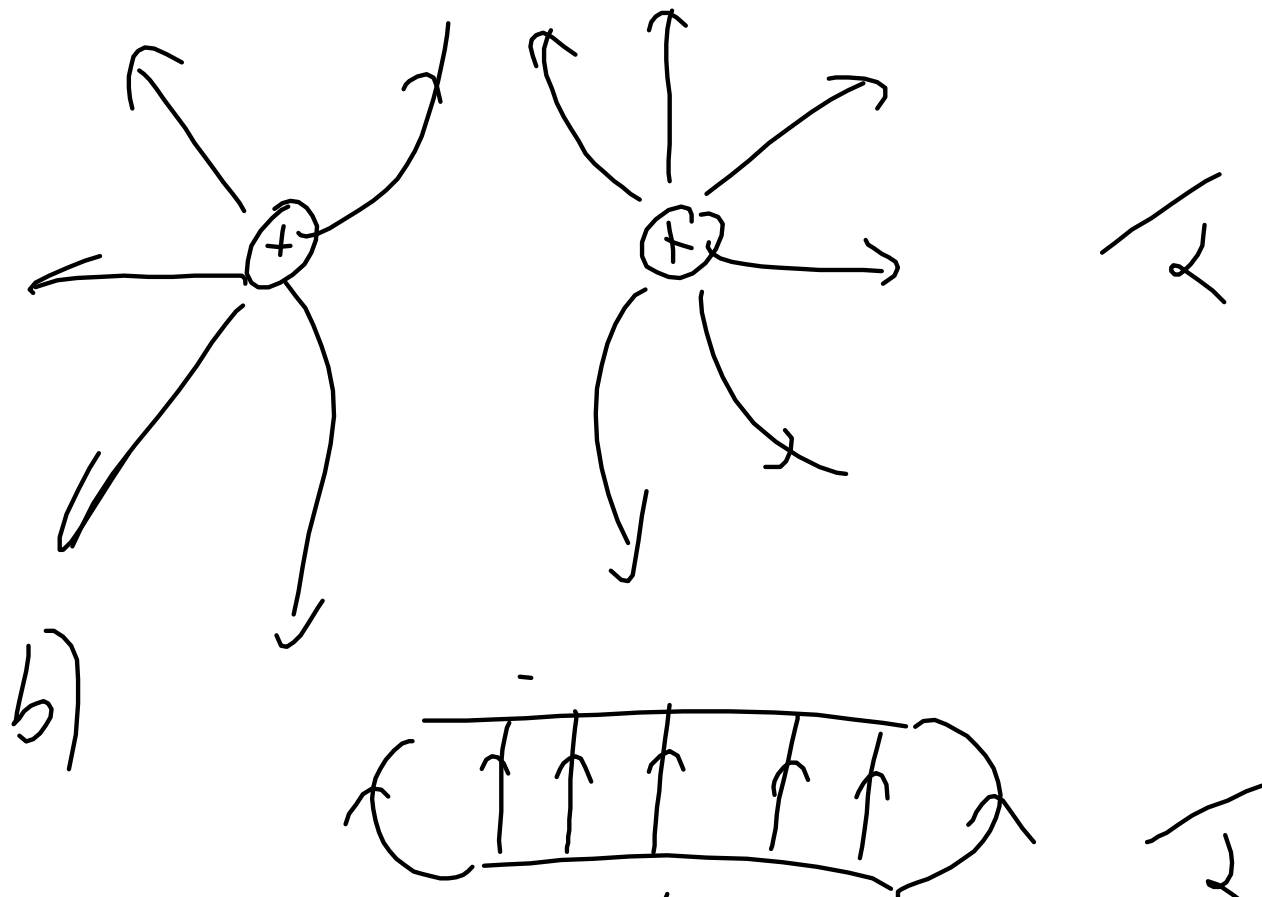


$$E^2 = \left(\frac{9 \times 10^9 \cdot 2 \times 10^{-9}}{0.035^2 + 0.035^2} \right)^2 + \left(\frac{9 \times 10^9 \cdot 3 \times 10^{-9}}{0.035^2 + 0.035^2} \right)^2$$

$$= (7.347 \times 10^6)^2 + (1.1 \times 10^6)^2$$

$E = 1.3 \times 10^7 \frac{N}{C}$

Quiz Solutions Block 1-1



$$2 \quad a = \frac{F}{m} = \frac{Eq}{m} = \frac{3 \times 10^5 (1.6 \times 10^{-19})}{9.1 \times 10^{-31}}$$

$$= \boxed{5.3 \times 10^{14} \text{ m/s}^2} \quad \sqrt{2}$$

$$3 \quad a) \quad E = E_1 \oplus E_2 \quad \downarrow \text{same direction}$$

$$E = \frac{kQ_1}{r^2} + \frac{kQ_2}{r^2}$$

$$\frac{9 \times 10^9}{0.035^2} (1 \times 10^{-6} + 3 \times 10^{-6})$$

$$= \boxed{2.9 \times 10^7 \text{ N/C}} \quad \sqrt{3}$$

b)

$$r = 0.06949$$

$$r = \sqrt{0.035^2 + 0.035^2}$$

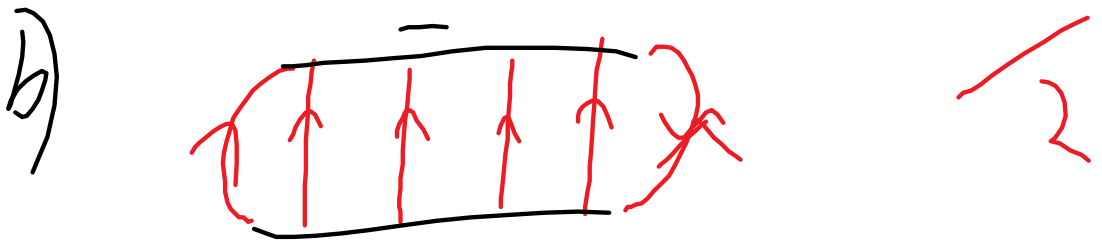
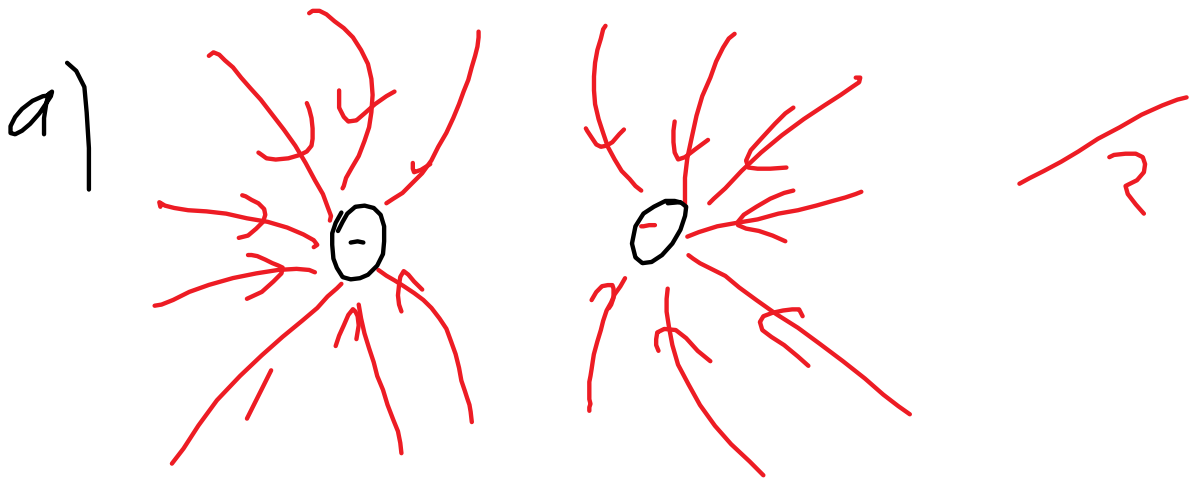


$$E^2 = \left(\frac{9 \times 10^9 \cdot 1 \times 10^{-4}}{2 \times 0.035^2} \right)^2 + \left(\frac{9 \times 10^9 \cdot 3 \times 10^{-4}}{2 \times (0.035)^2} \right)^2$$

$$(3.67 \times 10^6)^2 + (1.1 \times 10^7)^2$$

$$E = 1.2 \times 10^7 \frac{N}{C}$$

Block 1-3 Quiz



$$E = \frac{kq}{r^2} = \frac{9 \times 10^9 (1.6 \times 10^{-19})}{(1.1 \times 10^{-2})^2}$$

$$2 \quad a = \frac{F}{m} = \frac{F}{m} = \frac{9.1 \times 10^{-31}}{46.8 \times 10^{-16} \text{ m/s}^2} \quad \checkmark$$

$$3 a) \quad E \quad \cancel{F_e} \quad E$$

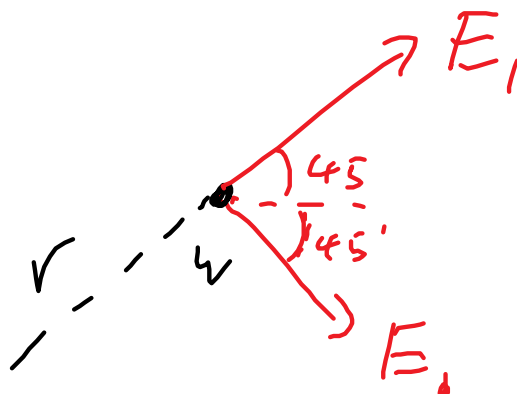
$$E = \frac{kQ}{r^2}$$

$$E = E_1 + |E_2|$$

$$= \frac{9 \times 10^9 (4 \times 10^{-6} \text{ C})}{0.035^2} + \frac{9 \times 10^9 (3 \times 10^{-6})}{0.035^2}$$

$$= 5.1 \times 10^7 \frac{\text{N}}{\text{C}} \quad \checkmark \quad \checkmark$$

b)



$$E^2 = E_1^2 + E_2^2$$

$$V = \sqrt{0.035^2 + 0.035^2}$$

$$E^2 = \left(\frac{9 \times 10^9 \cdot 4 \times 10^{-6}}{2(0.035)^2} \right) + \left(\frac{9 \times 10^9 (3 \times 10^{-6})^2}{2(0.035)^2} \right)$$

$$E = 1.8 \times 10^7 \frac{N}{C} \quad \sqrt{3}$$